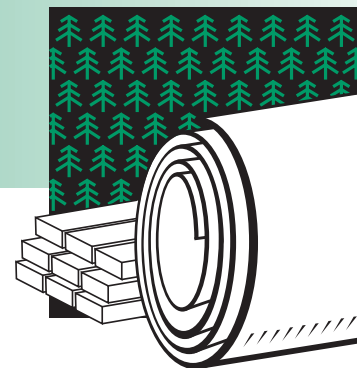


# FOREST PRODUCTS

## Project Fact Sheet



### BIOPULPING: AN ENERGY-EFFICIENT AND ENVIRONMENTALLY-BENIGN TECHNOLOGY FOR PAPERMAKING

#### COMMERCIAL SCALE DEMONSTRATION OF A BIOLOGICAL PRETREATMENT OF WOOD CHIPS SAVES ENERGY AND REDUCES POLLUTANTS IN MECHANICAL PULP MILLS

##### Benefits

- Could save 237 billion Btu of electricity per installation annually
- Could save the paper industry 0.7 trillion Btu annually by 2010
- Reduces electrical energy consumption by 30% in the mechanical pulping process
- Improves strength characteristics of mechanically produced pulp
- Could reduce the amount of air and water pollutants compared with conventional pulping
- Decreases reliance on blending chemical and mechanical pulp

##### Applications

The use of a decaying fungus in pretreatment is feasible for mechanical wood-pulping facilities. Biopulping is the treatment of wood chips prior to mechanical pulping. As a result, wood chips are softened, so less electrical energy is required for pulping and a stronger product is produced.

##### Project Partners

NICE<sup>3</sup> Program  
Washington, DC

Wisconsin Dept. of Administration  
Madison, WI

BioPulping International  
Madison, WI

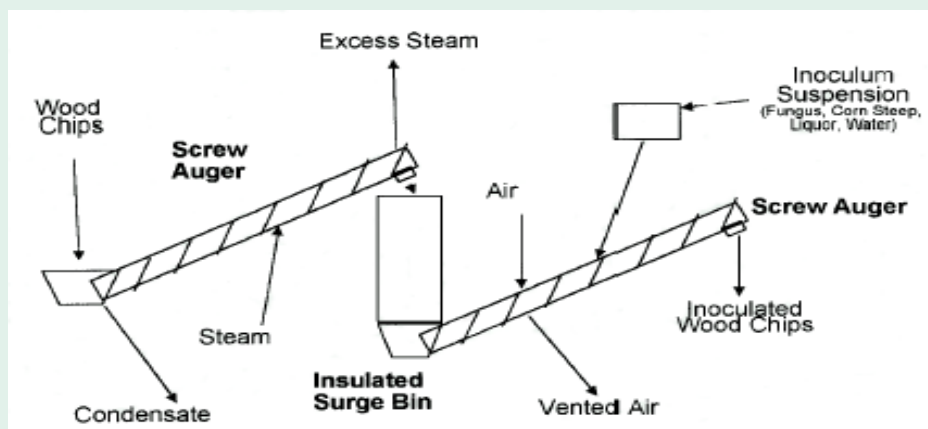
Andritz  
Springfield, OH

Stora Enso North America  
Wisconsin Rapids, WI

About 25% of the wood pulp produced in the world is created using the mechanical pulping method. This method has twice the yield of chemical pulping and is a practical way to extend raw materials. Mechanical pulping has two disadvantages—it is energy intensive and yields paper that is not as strong as paper produced from chemical processing. In many cases, chemical (Kraft) pulp is blended with mechanical pulp to add strength to the paper. However, chemical pulp is expensive and produces excessive amounts of air and water pollutants.

A new technology that offers a biopulping process with the potential to solve these problems is being tested on a commercial scale. Biopulping treats wood chips with a natural wood-decaying fungus prior to mechanical pulping and can save substantial amounts of electricity, improve paper quality, reduce the environmental impact of pulping, and enhance economic competitiveness.

##### BIOPULPING TREATMENT PROCESS



The new biological pretreatment process, being demonstrated by BioPulping International, Inc., improves paper strength while reducing energy and emissions.



## Project Description

**Goal:** Using a mobile system, the final goal is to conduct 50-ton trials to produce paper on a mill's paper machine using the biopulping method before mechanical pulping on a commercial scale.

Under the fungal pretreatment method, wood chips are steamed, cooled, inoculated with a specific natural fungus, and incubated for two weeks. During the incubation period, the fungus colonizes the surface and inside of the wood chips and secretes enzymes that degrade the lignin in the wood and soften the chips.

Wood chips treated with this process require less electrical energy in the pulping process and produce stronger pulp. The innovative features of this biopulping process are the identification of a specific fungus, the selection of an inexpensive fungal nutrient, and the development of a system that can produce treated chips in a continuous commercial operation.

Biopulping International, Inc., is developing this new technology with the help of a grant funded by the NICE<sup>3</sup> Program in the U.S. Department of Energy's Office of Industrial Technologies.

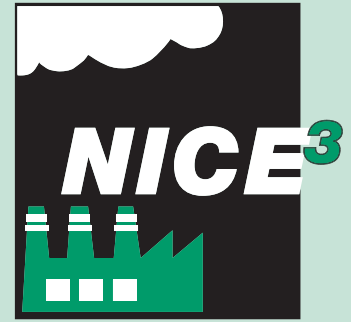
## Progress and Milestones

- Test 2-ton system at pilot scale.
- Test 50-ton mobile system at several mill sites.
- Using a professional environmental group, test and study the amount of volatile organic compounds associated with the process.
- Analyze data on energy consumption, paper strength, optical properties, and volatile organic compound emissions, and conduct economic analysis.
- Revisit the market analysis and revise the business plan.

## Economics and Commercial Potential

The use of fungus prior to pulping offers an attractive opportunity for mechanical wood pulp facilities. This technology could save an estimated 30% of the energy consumed in refining the mechanical pulp. The technology also improves paper strength, reduces pitch content, and could reduce the emissions of volatile organic compounds.

According to the data published in the industry-wide Pulp and Paper Directory, over 627 mechanical pulp mills operate today. These mills average 242 tons per day of pulp production. This technology could save 237 billion Btu of electricity per installation each year. First sales for the technology are expected by 2003. Annual savings by 2010 would be 0.7 trillion Btu with 3 mechanical pulping mills served. By 2020 the savings would grow to 5.6 trillion Btu from operations at 23 mills engaged in mechanical pulping.



**NICE<sup>3</sup> – National Industrial Competitiveness through Energy, Environment, and Economics:**  
An innovative, cost-sharing program to promote energy efficiency, clean production, and economic competitiveness in industry. This grant program provides funding to state and industry partnerships for projects that demonstrate advances in energy efficiency and clean production technologies. Awardees receive a one-time grant of up to \$525,000. Grants fund up to 50% of total project cost for up to 3 years.

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